Exercise - I (Conceptual Questions) Build Up Your Understanding

INTRODUCTION

1. $a \neq b \neq c$, $\alpha = \gamma = 90° \beta \neq 90°$ represents :
(1) Tetragonal system
(2) Orthorhombic system
(3) Monoclinic system
(4) Triclinic system

2. The most unsymmetrical crystal system is :
(1) Cubic (2) Hexagonal
(3) Triclinic (4) Orthorhombic

3. Bravais lattices are of :
(1) 10 types (2) 8 types
(3) 7 types (4) 14 types

4. The crystal system of a compound with unit cell dimensions a = 0.387, b = 0.387 and c=0.504 nm and $\alpha=\beta$ =90° and γ=120° is :
(1) Cubic (2) Hexagonal
(3) Orthorhombic (4) Rhombohedral

ANALYSIS OF CUBIC CRYSTAL

5. In a simple cubic cell, each atom on a corner is shared by :
(1) 2 unit cells (2) 1 unit cell
(3) 8 unit cells (4) 4 unit cells

6. In a face centred cubic cell, an atom at the face contributes to the unit cell :
(1) 1part (2) 1/2 part
(3) 1/4part (4) 1/8 part

7. In a body centred cubic cell, an atom at the body centre is shared by :
(1) 1 unit cell (2) 2 unit cell
(3) 3 unit cells (4) 4 unit cells

8. Which of the following type of cubic lattice has maximum number of atoms per unit cell?
(1) Simple cubic
(2) Body centred cubic
(3) Face centred cubic
(4) All have same

9. The number of atoms present in a unit cell of a monoatomic element of a simple cubic lattice, body-centred cubic and face centred cubic respectively are
(1) 8, 9 and 14 (2) 1, 2 and 4
(3) 4, 5 and 6 (4) 2, 3 and 5

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10. Which one of the following is a primitive unit cell?
(1) Simple cubic (2) BCC
(3) FCC (4) BCC and FCC both

11. In a body centred cubic unit cell, a metal atom at the centre of the cell is surrounded by how many other metal atoms :
(1) 8 (2) 6 (3) 12 (4) 4

12. A compound is formed by elements A and B. This crystallises in cubic structure when atoms A are at the corners of the cube and atoms B are at the body centre. The simplest formula of the compound is :
(1) AB (2) AB_2 (3) A_2B (4) AB_4

13. The fraction of total volume occupied by the atoms present in a simple cubic lattice is –
(1) $\frac{\pi}{6}$ (2) $\frac{\pi}{3\sqrt{2}}$ (3) $\frac{\pi}{4\sqrt{2}}$ (4) $\frac{\pi}{4}$

14. Sodium metal crystallises in BCC lattice with the cell edge length (a) = 42.29 Å. What is the radius of sodium atom ?
(1) 1.86 Å (2) 1.90 Å
(3) 18.3 Å (4) 1.12 Å

15. An element has BCC structure having 12.08×10^{23} unit cells. The number of atoms in these cells is :
(1) 12.08×10^{23} (2) 24.16×10^{23}
(3) 48.38×10^{23} (4) 12.08×10^{22}

16. A metal has BCC structure and the edge length of its unit cell is 3.04 Å. The volume of the unit cell in cm^3 will be :
(1) 1.6×10^{-21} cm^3 (2) 2.81×10^{-23} cm^3
(3) 6.02×10^{-23} cm^3 (4) 6.6×10^{-24} cm^3

CRYSTAL DENSITY

17. If 'a' stands for the edge length of the cubic systems: simple cubic, body centred cubic and face centred cubic, then the ratio of radii of the spheres in these system will be respectively.
(1) $\frac{1}{2}a : \sqrt{3}a : \frac{1}{\sqrt{2}}a$ (2) $\frac{1}{2}a : \frac{\sqrt{3}}{2}a : \frac{\sqrt{2}}{2}a$
(3) 1a : $\sqrt{3}a : \sqrt{2}a$ (4) $\frac{1}{2}a : \frac{\sqrt{3}}{4}a : \frac{1}{2\sqrt{2}}a$

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18. An element crystallises in BCC structure. The edge length of its unit cell is 288 pm. If the density of the crystal is 7.2 g cm^{-3}. What is the atomic mass of the element?
(1) 51.8 (2) 103.6 (3) 25.9 (4) 207.2

19. An element A crystallises in fcc structure. 200 g of this element has 4.12×10^{24} atoms. The density of A is 7.2 g cm^{-3}. Calculate the edge length of the unit cell.
(1) 26.97×10^{-24} cm (2) 299.9 pm
(3) 5×10^{-12} cm (4) 2.99 cm

20. Density of Li atom is 0.53 g cm^{-3}. The edge length of Li is 3.5 Å. Find out the number of Li atoms in an unit cell. ($N_A = 6.023 \times 10^{23}$), (M= 6.94 g mol^{-1})
(1) 2 (2) 8 (3) 4 (4) 6

CLOSE PACKING OF IDENTICAL SOLID SPHERES

21. The coordination number of hexagonal closest packed (HCP) structure is
(1) 12 (2) 10 (3) 8 (4) 6

22. The ABAB close packing and ABC ABC close packing are respectively called :-
(1) Hexagonal close packing(hcp) and cubic close packing (ccp)
(2) ccp and hcp
(3) Body centred cubic (bcc) packing and hexagonal close packing (hcp)
(4) hcp and bcc

23. The space occupied in BCC arrangement is
(1) 74% (2) 70% (3) 68% (4) 60.4%

24. The vacant space in BCC unit cell is
(1) 32% (2) 10% (3) 23% (4) 46%

25. The space occupied by spheres of equal size in three dimensions in both HCP and CCP arrangement is
(1) 74% (2) 70% (3) 60.4% (4) 52.4%

26. The empty space in the HCP and CCP is about
(1) 26% (2) 30% (3) 35% (4) 40%

27. Which one of the following is not a close packing ?
(1) hcp (2) ccp (3) bcc (4) fcc

28. Close packing is maximum in the crystal lattice of
(1) Simple cubic
(2) Face centred
(3) Body centred
(4) Simple cubic and body centred

29. Which of the following has HCP structure ?
(1) Al (2) Mg (3) Cu (4) Ni

30. All noble gases crystallise in the CCP structure except
(1) Helium (2) Neon
(3) Argon (4) Krypton

31. If the coordination number of an element in its crystal lattice is 8, then packing is :
(1) FCC (2) HCP
(3) BCC (4) None of the above

HOLES / VOIDS IN CRYSTALS

32. A tetrahedral void in a crystal implies that
(1) shape of the void is tetrahedral
(2) molecules forming the void are tetrahedral in shape
(3) the void is surrounded tetrahedrally by four spheres
(4) the void is surrounded by six spheres

33. In a closest packed lattice, the number of octahedral sites as compared to tetrahedral ones will be
(1) Equal (2) Half
(3) Double (4) One fourth

34. The coordination number of a cation occupying an octahedral void is
(1) 4 (2) 6 (3) 8 (4) 12

35. The size of an octahedral void formed in a closest packed lattice as compared to tetrahedral void is
(1) Equal (2) Smaller
(3) Larger (4) Not definite

36. The coordination number of a cation occupying a tetrahedral void is
(1) 4 (2) 6 (3) 8 (4) 12

37. Number of tetrahedral voids per atom in a crystal lattice is :
(1) 1 (2) 2 (3) 4 (4) 8

38. A compound contains P and Q elements. Atoms Q are in CCP arrangement while P occupy all tetrahedral sites. Formula of compound is :
(1) PQ (2) PQ_2 (3) P_2Q (4) P_3Q

39. If 'Z' is the number of atoms in the unit cell that represents the closest packing sequence ABCABC---, the number of tetrahedral voids in the unit cell is equal to
(1) Z (2) 2Z (3) Z/2 (4) Z/4

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40. If a unit cell of fcc lattice is divided into eight identical small cubes, then
(1) Each small cube contains one octahedral void.
(2) Every alternate small cube contains one octahedral void.
(3) Each small cube contains one tetrahedral void.
(4) Every alternate small cube contains one tetrahedral void.

IONIC CRYSTAL

41. The limiting radius ratio for tetrahedral shape is
(1) 0 to 0.155 (2) 0.155 to 0.225
(3) 0.225 to 0.414 (4) 0.414 to 0.732

42. For an octahedral arrangement, the lowest radius ratio limit is
(1) 0.155 (2) 0.732 (3) 0.414 (4) 0.225

43. If the radius ratio is in the range of 0.414 - 0.732 then the co-ordination number will be :
(1) 2 (2) 4 (3) 6 (4) 8

44. r^+/r^- ratio in NaCl crystal is :
(1) 0.4 (2) 0.98 (3) 1.0 (4) 0.52

45. Which one of the following statements is incorrect about rock salt structure :
(1) Na^+ occupy octahedral voids
(2) Na^+ and Cl^- ions have a co-ordination number of 6 : 6
(3) A unit cell of NaCl consists of four NaCl units
(4) All halides of alkali metals have rock-salt type structure

46. In sodium chloride, Cl^- ions form ccp arrangement. Which sites are occupied by Na^+ in this structure ?
(1) Cubical void (2) Tetrahedral void
(3) Octahedral void (4) Triangular void

47. The positions of Cl^- ions in NaCl structure are
(1) Corners of the cube
(2) Centres of faces of the cube
(3) Corners as well as centres of the faces of the cube
(4) Edge centres of the cube

48. The number of NaCl units present in a unit cell of NaCl are
(1) 1 (2) 2 (3) 4 (4) 8

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49. The tetrahedral voids formed by ccp arrangement of Cl^- ions in rock salt structure are
(1) Occupied by Na^+ ions
(2) Occupied by Cl^- ions
(3) Occupied by either Na^+ or Cl^- ions
(4) Vacant

50. The structure of MgO is similar to NaCl. The co-ordination number of Mg is
(1) 2 (2) 6 (3) 4 (4) 8

51. The co-ordination number of Cs^+ and Cl^- ions in CsCl structure is
(1) 4 : 4 (2) 6 : 6 (3) 8 : 8 (4) 4 : 8

52. A unit cell of CsCl consists of
(1) One CsCl unit (2) Two CsCl units
(3) Four CsCl units (4) Eight CsCl units

53. The NaCl structure can be converted into CsCl structure
(1) By application of high pressure
(2) By heating to 760 K
(3) Both by heat and pressure
(4) The conversion is not possible

54. TlCl has structure similar to CsCl. The co-ordination number of Tl^+ is
(1) 4 (2) 6 (3) 10 (4) 8

55. The co-ordination number of Zn^{2+} and S^{2-} ions in the zinc blende (ZnS) type structure is
(1) 4 : 4 (2) 6 : 6 (3) 8 : 8 (4) 4 : 8

56. The co-ordination number of calcium fluoride (CaF_2) type structure is
(1) 1 : 2 (2) 4 : 4 (3) 4 : 8 (4) 8 : 4

57. The number of formula units in an unit cell of fluorite structure is
(1) 2 (2) 4 (3) 6 (4) 8

58. 4 : 4 Co-ordination is found in
(1) ZnS (2) CuCl (3) AgI (4) All

59. Antifluorite structure can be derived from fluorite structure by
(1) Heating fluorite crystal lattice.
(2) Subjecting fluorite structure to high pressure.
(3) Interchanging the positions of positive and negative ions in the lattice.
(4) All of the above

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60. The radius of Na^+ is 95 pm and that of Cl^- ion is 181 pm. Hence the co-ordination number of Na^+ will be
(1) 4 (2) 6 (3) 8 (4) 12

61. The ionic radii of Rb^+ and I^- are 1.46 and 2.16 Å respectively. The most probable type of structure exhibited by it is
(1) CsCl type (2) NaCl type
(3) ZnS type (4) CaF_2 type

62. A solid XY has a bcc structure. If the distance of closest approach between the two ions is 173 pm, the edge length of unit cell is
(1) 200 pm (2) $\frac{\sqrt{3}}{\sqrt{2}}$ pm
(3) 142.2 pm (4) $\sqrt{2}$ pm

63. If the distance between Na^+ and Cl^- ions in NaCl crystal is 'x' pm, what is the length of the cell edge?
(1) 2x pm (2) x/2 pm (3) 4x pm (4) x/4 pm

64. In a NaCl type crystal, distance between Na^+ and Cl^- ion is 2.814 Å and the density of solid is 2.167 g cm^{-3} then find out the value of Avogadro constant.
(1) 6.05×10^{23} (2) 3.02×10^{23}
(3) 12.10×10^{23} (4) 9.6×10^{24}

65. The density of crystalline sodium chloride is 5.85 g cm^{-3}. What is the edge length of the unit cell.
(1) 4.06×10^{-8} cm (2) 1.32×10^{-14} cm
(3) 7.8×10^{-23} cm (4) 9.6×10^{-24} cm

66. A unit cell of sodium chloride has four formula units. The edge length of unit cell is 0.6 nm. What is the density of sodium chloride ?
(1) 7.60 g cm^{-3} (2) 1.80 g cm^{-3}
(3) 9.60 g cm^{-3} (4) 6.38 g cm^{-3}

IMPERFECTIONS IN SOLIDS

67. At zero kelvin, most of the ionic crystals possess
(1) Frenkel defect (2) Schottky defect
(3) Metal excess defect (4) No defect

68. As a result of Schottky defect
(1) There is no effect on the density
(2) Density of the crystal increases
(3) Density of the crystal decreases
(4) Any of the above three can happen

69. Schottky as well as frenkel defects are observed in the crystal of
(1) NaCl (2) AgBr (3) AgCl (4) $MgCl_2$

70. Frenkel defect is generally observed in
(1) AgBr (2) Agl
(3) ZnS (4) All of these

71. Frenkel defect is found in crystals in which the radius ratio is :
(1) low
(2) 1.3
(3) 1.5
(4) slightly less than unity

EXERCISE-I (Conceptual Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	3	3	4	2	3	2	1	3	2	1	1	1	1	3	2
Question	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Answer	2	4	1	2	1	1	1	3	1	1	1	3	2	2	1
Question	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Answer	3	3	2	2	3	1	2	3	2	3	3	3	3	4	4
Question	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Answer	3	3	3	4	2	3	1	1	4	1	4	2	4	3	2
Question	61	62	63	64	65	66	67	68	69	70	71				
Answer	2	1	1	1	1	2	4	3	2	4	1				

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Exercise - II (Previous Year Questions) Build Up Your Understanding

AIPMT 2009

1. Lithium metal crystallises in a body centred cubic crystal. If edge length of unit cell of lithium is 351 pm, the atomic radius of the lithium will be :-

(1) 300.5 pm (2) 240.8 pm
(3) 151.8 pm (4) 75.5 pm

2. Copper crystallises in a face-centred cubic lattice with a unit cell length of 361 pm. What is the radius of copper atom in pm ?

(1) 108 (2) 128 (3) 157 (4) 181

AIPMT 2010

3. AB crystallizes in a body centred cubic lattice with edge length 'a' equal to 387 pm. The distance between two oppositely charged ions in the lattice is :-

(1) 300 pm (2) 335 pm
(3) 250 pm (4) 200 pm

AIPMT Mains. 2011

4. A solid compound XY has NaCl structure. If the radius of the cation is 100 pm the radius of the anion (Y^-) will be :-

(1) 165.7 pm (2) 275.1 pm
(3) 322.5 pm (4) 241.5 pm

AIPMT Pre. 2012

5. The number of octahedral void(s) per atom present in a cubic-close-packed structure is:

(1) 2 (2) 4 (3) 1 (4) 3

6. A metal crystallizes with a face-centered cubic lattice. The edge of the unit cell is 408 pm. The diameter of the metal atom is:

(1) 144 pm (2) 204 pm
(3) 288 pm (4) 408 pm

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AIPMT Mains 2012

7. Structure of a mixed oxide is cubic close-packed (CCP). The cubic unit cell of mixed oxide is composed of oxide ions. One fourth of the tetrahedral voids are occupied by divalent metal A and the octahedral voids are occupied by a monovalent metal B. The formula of the oxide is:

(1) $A_2B_3O_4$ (2) AB_2O_2
(3) ABO_2 (4) A_2BO_2

NEET-UG 2013

8. The number of carbon atoms present per unit cell of diamond is :-

(1) 1 (2) 4 (3) 8 (4) 6

9. A metal has a FCC lattice. The edge length of the unit cell is 404 pm. The density of the metal is 2.72g cm^{-3}. The molar mass of the metal is :-

(1) 20g mol^{-1} (2) 40g mol^{-1}
(3) 30g mol^{-1} (4) 27g mol^{-1}

AIPMT 2014

10. If a is the length of the side of a cube, the distance between the body centered atom and one corner atom in the cube will be :

(1) $\frac{2}{\sqrt{3}}a$ (2) $\frac{4}{\sqrt{3}}a$ (3) $\frac{\sqrt{3}}{4}a$ (4) $\frac{\sqrt{3}}{2}a$

AIPMT 2015

11. A given metal crystallizes out with a cubic structure having edge length of 361 pm. If there are four metal atoms in one unit cell, what is the radius of one atom?

(1) 127 pm (2) 80 pm
(3) 108 pm (4) 40 pm

Re-AIPMT 2015

12. The vacant space in BCC lattice unit cell is :

(1) 23% (2) 32%
(3) 26% (4) 48%

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13. The correct statement regarding defects in crystalline solids is :-
(1) Frenkel defect is a dislocation defect
(2) Frenkel defect is found in halides of alkaline metals
(3) Schottky defects have no effect on the density of crystalline solids
(4) Frenkel defects decrease the density of crystalline solids

NEET-I 2016

14. Lithium has a BCC structure. Its density is 530 kg m^{-3} and its atomic mass is 6.94 g mol^{-1}. Calculate the edge length of a unit cell of Lithium metal. ($N_A = 6.02 \times 10^{23}$ mol^{-1})
(1) 154 pm (2) 352 pm
(3) 527 pm (4) 264 pm

15. The ionic radii of A^+ and B^- ions are 0.98×10^{-10} m and 1.81×10^{-10} m. The coordination number of each ion in AB is :-
(1) 6 (2) 4 (3) 8 (4) 2

NEET-II 2016

16. In calcium fluoride, having the fluorite structure, the coordination numbers for calcium ion (Ca^{2+}) and fluoride ion (F^-) are
(1) 8 and 4 (2) 4 and 8
(3) 4 and 2 (4) 6 and 6

NEET(UG) 2017

17. Which is the incorrect statement ?
(1) Density decreases in case of crystals with Schottky's defect
(2) NaCl(s) is insulator, silicon is semiconductor, silver is conductor, quartz is piezo electric crystal
(3) Frenkel defect is favoured in those ionic compounds in which sizes of cation and anions are almost equal
(4) $FeO_{0.98}$ has non stoichiometric metal deficiency defect

NEET-II 2018

18. Iron exhibits bcc structure at room temperature. Above 900°C, it transforms to fcc structure. The ratio of density of iron at room temperature to that at 900°C (assuming molar mass and atomic radii of iron remains constant with temperature) is
(1) $\frac{\sqrt{3}}{\sqrt{2}}$ (2) $\frac{4\sqrt{3}}{3\sqrt{2}}$ (3) $\frac{3\sqrt{3}}{4\sqrt{2}}$ (4) $\frac{1}{2}$

NEET-(UG) 2019

19. A compound is formed by cation C and anion A. The anions form hexagonal close packed (hcp) lattice and the cations occupy 75% of octahedral voids. The formula of the compound is :-
(1) C_2A_3 (2) C_3A_2 (3) C_3A_4 (4) C_4A_3

NEET-(UG) 2019 (Odisha)

20. Formula of nickel oxide with metal deficiency defect in its crystal is $Ni_{0.98}O$. The crystal contains Ni^{2+} and Ni^{3+} ions. The fraction of nickel existing as Ni^{2+} ions in the crystal is
(1) 0.96 (2) 0.04 (3) 0.50 (4) 0.31

NEET (UG) 2020

21. An element has a body centered cubic (bcc) structure with a cell edge of 288 pm. The atomic radius is:
(1) $\frac{4}{\sqrt{2}} \times 288\,\text{pm}$ (2) $\frac{\sqrt{3}}{4} \times 288\,\text{pm}$
(3) $\frac{\sqrt{2}}{4} \times 288\,\text{pm}$ (4) $\frac{4}{\sqrt{3}} \times 288\,\text{pm}$

NEET (UG) 2020 (COVID-19)

22. Which one of the following compounds shows both, Frenkel as well as Schottky defects ?
(1) AgBr (2) AgI (3) NaCl (4) ZnS

NEET (UG) 2021

23. Right option for the number of tetrahedral and octahedral voids in hexagonal primitive unit cell are:
(1) 8, 4 (2) 6, 12 (3) 2, 1 (4) 12,6

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24. The correct option for the number of body centred unit cells in all 14 types of Bravais lattice unit cells is :

(1) 7 (2) 5 (3) 2 (4) 3

NEET (UG) 2022

25. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : In a particular point defect, an ionic solid is electrically neutral, even if few of its cations are missing from its unit cells.

Reason (R) : In an ionic solid, Frenkel defect arises due to dislocation of cation from its lattice site to interstitial site, maintaining overall electrical neutrality.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

(2) (A) is correct but (R) is not correct

(3) (A) is not correct but (R) is correct.

(4) Both (A) and (R) are correct and (R) is the correct explanation of (A)

26. Copper crystallises in fcc unit cell with cell edge length of 3.608×10^{-8} cm. The density of copper is 8.92 g cm^{-3}. Calculate the atomic mass of copper.

(1) 31.55 u (2) 60 u

(3) 65 u (4) 63.1 u

EXERCISE-II (Previous Year Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	3	2	2	4	3	3	2	3	4	4	1	2	1	2	1
Question	16	17	18	19	20	21	22	23	24	25	26				
Answer	1	3	3	3	1	2	1	4	4	1	4				

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Exercise - III (Analytical Questions) Build Up Your Understanding

1. Consider the following statements :-

(a) Glass is isotropic in nature

(b) T.H.V and O.H.V are found in B.C.C.

(c) Nearest distance between opposite ions in Rock salt structure is $\frac{a}{2}$ (a=Edge length of unit cell)

(d) Density of unit cell decrease in both schottky and frenkel defect

Which statements are correct :

(1) a, b (2) a, c

(3) b, c (4) a, b, c

2. Match the following column-I and column-II

	Column-I		Column-II
(a)	CaF_2	(p)	Molecular solid
(b)	Cu	(q)	Covalent solid
(c)	Ice	(r)	Ionic solid
(d)	Diamond	(s)	Metallic solid

(1) (a) → (q), (b) → (p), (c) → (s), (d) → (r)

(2) (a) → (r), (b) → (s), (c) → (p), (d) → (q)

(3) (a) → (r), (b) → (s), (c) → (q), (d) → (p)

(4) (a) → (s), (b) → (p), (c) → (q), (d) → (r)

3. Given below are two statements; one is labelled as **Assertion (A)** and the other is labelled as **Reason(R)** .

Assertion (A) : Number of tetrahedral voids is double the number of octahedral voids.

Reason (R) : Size of tetrahedral void is more than size of octahedral void.

In the light of the above statements, choose the **most appropriate** answer from the options given below :

(1) (A) is correct but (R) is not correct

(2) Both (A) and (R) are correct and (R) is correct explanation of (A)

(3) Both (A) and (R) are correct but (R) is not correct explanation of (A)

(4) (A) is not correct but (R) is correct

4. Given below are two statements:

Statement-I : NaCl contains approximately 10^6 Schottky pairs per cm^3 at room temperature.

Statement-II : Schottky defect is a dislocation defect.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both statement-I and statement-II are incorrect.

(2) Statement-I and statement-II are correct.

(3) Statement-I is incorrect but statement-II is correct.

(4) Statement-I is correct but statement-II is incorrect

5. Consider the following statements

(a) Atom present at face-centre of cubic unit cell is shared between four adjacent unit cells.

(b) In F.C.C, atoms present at corners of unit cell touch each other.

(c) An element crystallising in F.C.C has a co-ordination number of 12.

(d) F.C.C arrangement has unoccupied space of 26%

Which statements are **NOT CORRECT**.

(1) (a), (b), (c) (2) (a), (b)

(3) (b), (c) (4) (c), (d)

6. Given below are two statements:

Statement-I : Hexagonal close packing in three dimensions is denoted by ABABAB..... .

Statement-II: Hexagonal close packing in three dimensions has co-ordination number of 12.

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In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both statement-I and statement-II are incorrect.

(2) Statement-I and statement-II are correct.

(3) Statement-I is incorrect but statement-II is correct.

(4) Statement-I is correct but statement-II is incorrect

7. Given below are two statements; one is labelled as **Assertion (A)** and the other is labelled as **Reason(R)** .

Assertion (A) : NaCl Crystal with metal excess defect show yellow colour

Reason (R) : In NaCl crystal with metal excess defect, colour is observed due to excitation of electrons present in interstitial sites.

In the light of the above statements, choose the **most appropriate** answer from the options given below :

(1) (A) is correct but (R) is not correct

(2) Both (A) and (R) are correct and (R) is correct explanation of (A)

(3) Both (A) and (R) are correct but (R) is not correct explanation of (A)

(4) (A) is not correct but (R) is correct

8. Given below are two statements:

Statement-I : Graphite is a molecular solid.

Statement-II : Graphite is a good conductor of electricity.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both statement-I and statement-II are incorrect.

(2) Statement-I and statement-II are correct.

(3) Statement-I is incorrect but statement-II is correct.

(4) Statement-I is correct but statement-II is incorrect

TG: @Chalnaayaaar

9. Match the following column-I and column-II

Column-I		Column-II	
(a)	Cubic	(p)	$a \neq b \neq c$ (1 lattice arrangement)
(b)	Orthorhombic	(q)	$a = b = c$ (1 lattice arrangement)
(c)	Rhombohedral or Trigonal	(r)	$a \neq b \neq c$ (4 lattice arrangements)
(d)	Triclinic	(s)	$a = b = c$ (3 lattice arrangements)

(1) (a) → (q), (b) → (p), (c) → (r), (d) → (s)

(2) (a) → (s), (b) → (p), (c) → (q), (d) → (r)

(3) (a) → (s), (b) → (r), (c) → (q), (d) → (p)

(4) (a) → (q), (b) → (r), (c) → (s), (d) → (p)

10. Given below are two statements:

Statement-I : Metals like Magnesium and Zinc have packing efficiency of 68% in their crystals.

Statement-II : Metals like copper and sliver have co-ordination number of 12 and show hexagonal close packing.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both statement-I and statement-II are incorrect.

(2) Statement-I and statement-II are correct.

(3) Statement-I is incorrect but statement-II is correct.

(4) Statement-I is correct but statement-II is incorrect

11. Given below are two statements:
Statement-I : In NaCl crystal, Co-ordination number of cation is 6.
Statement-II : NaCl crystal may exhibit metal deficiency defect.
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Both statement-I and statement-II are incorrect.
(2) Statement-I and statement-II are correct.
(3) Statement-I is incorrect but statement-II is correct.
(4) Statement-I is correct but statement-II is incorrect

12. Given below are two statements:
Statement-I : In crystalline solids, value of refractive index is different when measured along different directions.
Statement-II : Crystalline solids exhibit long range order.
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Both statement-I and statement-II are incorrect.
(2) Statement-I and statement-II are correct.
(3) Statement-I is incorrect but statement-II is correct.
(4) Statement-I is correct but statement-II is incorrect

13. Given below are two statements; one is labelled as **Assertion (A)** and the other is labelled as **Reason(R)** .
Assertion (A) : When NaCl is doped with $SrCl_2$, cationic vacancies produced are equal to number of Sr^{+2} ions.
Reason (R) : Each Sr^{+2} replaces $2Na^+$ ions, occupies the site of one ion and other site remains vacant.
In the light of the above statements, choose the **most appropriate** answer from the options given below :
(1) (A) is correct but (R) is not correct
(2) Both (A) and (R) are correct and (R) is correct explanation of (A)
(3) Both (A) and (R) are correct but (R) is not correct explanation of (A)
(4) (A) is not correct but (R) is correct

14. Match the following column-I and column-II

	Column-I		**Column-II**
(a)	Rock Salt structure	(p)	100% T.H.V occupied by cation
(b)	Zinc Blend structure	(q)	100% T.H.V occupied by anion
(c)	Flourite structure	(r)	100% O.H.V occupied by cation
(d)	Anti-Flourite structure	(s)	50% T.H.V occupied by cation

(1) (a) → (r), (b) → (s), (c) → (p), (d) → (q)
(2) (a) → (q), (b) → (r), (c) → (p), (d) → (s)
(3) (a) → (p), (b) → (r), (c) → (s), (d) → (q)
(4) (a) → (r), (b) → (s), (c) → (q), (d) → (p)

15. Consider the following statements
(a) Solid MX with schottky defect will contain equal number of cationic and anionic vacancies.
(b) Co-ordination number of each carbon atom in diamond is 4.
(c) A crystal contains schottky defect at absolute zero temperature
(d) For zinc blend (ZnS) structure, edge length = $\frac{4}{\sqrt{3}} \times (r_c + r_a)$
Which statements are correct -
(1) (a), (b) (2) (b), (c), (d)
(3) (a), (c), (d) (4) (a), (b), (d)

EXERCISE-III (Analytical Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	2	2	1	4	2	2	1	3	3	1	4	2	2	4	4

Important Notes